Reg. No.: .....

Name : .....

M 13836

Third Semester M.Sc. Degree Examination, November 2007
STATISTICS
Paper – 3.4 : Operations Research

Time: 3 Hours Max. Marks: 70

Instruction *: (Answer **five** questions without omitting any **Unit**. **All** questions carry **equal** marks)*

UNIT – I

1. a) Explain the simplex procedure to solve a linear programming problem. What is the difference between the simplex method and exhaustive enumeration of feasible corner points of the constrained region ?

   b) Explain the use of artificial variables in linear programming and describe a method to solve such problems.

2. a) Describe the revised simplex procedure for the solution of linear programming problem. Explain why it is superior to the usual simplex method.

   b) Define primal problem and dual problem. Prove that dual of a given primal is again primal.

UNIT – II

3. a) Derive the Kuhn – Tucker conditions for the problem of maximising $f(x)$ subject to the constraints $g(x) \leq b$ and $x \geq 0$. Show also that these conditions are sufficient if $f(x)$ is concave and $g(x)$ is convex.

   b) What is meant by quadratic programming ? How does quadratic programming problem differ from the linear programming problem ?

4. a) Describe briefly the Wolfe's method for solving a quadratic programming problem.

   b) Describe recursive equation approach to solve dynamic programming problems.

P.T.O.

UNIT – III

5. a) What is a queue ? Explain the basic elements of queues.

   b) For a single server, Poisson arrival and exponential service time queueing system, obtain the steady state equations satisfied by the probability P_n of n customers in the system and hence obtain P_n.

6. a) For a {(M/M/C) : (∞/FCFS)} queueing model, derive the expression for (i) the steady state equation (ii) expected number of customers in the queue, and (iii) expected number of customers in the system.

   b) For a {M/G/I) : (∞/FCFS)} queueing model, derive the Pollaczek - khintchine (P – K) formula for expected number of customers in the system.

UNIT – IV

7. a) Describe the basic characteristics of an inventory system.

   b) With usual notations derive the EOQ formula for the production model with shortages.

8. a) Discuss the EOQ problem with two price breaks.

   b) Discuss the problem of inventory control when the stochastic demand is uniform, production of commodity is instantaneous and lead time is negligible.

UNIT – V

9. a) What is game theory ? Describe a two - person zero-sum game. Explain the method of solving a zero-sum two-person game as a linear programming problem.

   b) What is a replacement problem ? Develop a model for the replacement of equipment whose maintenance costs are incurred in the beginning of the different time periods and value of money changes with time.

10. a) A project consists of activities A, B, C - - , H, I. The notation X < Y means that the activity X must be completed before Y can start and X, Y < W means W will start only after completion of the activities X and Y. With this notation, construct the network diagram for the following constraints :

A < D; A < E; B <F; C < G; D < H; E, F < I

The project has the following time schedules of the above activites :

Task	:	A	B	C	D	E	F	G	H	I
Optimistic time	:	5	18	26	16	15	6	7	7	3
Pessimistic time	:	10	22	40	20	25	12	12	9	5
Most likely time	:	8	20	33	18	20	9	10	8	4

Determine the following :

i) Expected task times and their variances.

ii) The duration of the project that will have 95% chance of being completed.

b) Write a short note on Monto-Carlo simulation. Explain the use of Monto-Carlo Simulation in inventory.
